

REMARKS

In this Amendment, Applicant has amended claim 4 to more appropriately define the present invention. In making this amendment, Applicant submits that no new matter has been added.

Claims 1-12 are pending in the present application. In the Office Action, the Examiner rejected claims 1 and 7 under 35 U.S.C. § 103(a) as unpatentable over Furukawa et al. (U.S. Patent No. 5,463,618) in view of so-called Applicant's Admitted Prior Art (AAPA); rejected claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al. in view of AAPA and further in view of Schalk (U.S. Patent No. 5,475,791); rejected claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al., AAPA, Schalk, further in view of Flores et al. ("Continuous Speech Recognition in Noise Using Spectral Subtraction and HMM Adaptation," 1994); rejected claims 4-5 and 10-11 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al., AAPA, and Schalk further in view of Rahim et al. ("Signal Conditioning Techniques for Robust Speech Recognition," 1996), Flores et al. and so-called well known prior art; and rejected claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Rahim et al. and so-called well known prior art.

Applicant respectfully traverses the rejections of claims 1-12, as detailed above, for the following reasons.

Rejection under 35 U.S.C. § 103(a)

Applicant respectfully traverses the rejection of claims 1-12 under 35 U.S.C. § 103(a) because a *prima facie* case of obviousness has not been established by the Examiner.

In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim elements. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings. Third, there must be a reasonable expectation of success. See M.P.E.P. § 2143.

I. Claims 1 and 7

The Examiner rejected claims 1 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al. in view of AAPA.

Claim 1 recites a speech processing apparatus comprising, among other things, “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal; storage means for storing one or more impulse responses in each frame; and control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means.”

Each of the decision means, the storage means, and the control means recited in claim 1 perform their respective recited functions *in each frame*. In contrast to the present claimed invention, Furukawa et al. discloses “[i]t is assumed that signal processing in the following description is performed all in digital form and that the signal is sampled at a frequency of 8 KHz.” Id. at col. 5, lines 54-57. In fact, each of the embodiments of Furukawa et al. teaches performing all the functions at each sample at a frequency of 8 KHz. See id., col. 11, lines 51-53, col. 13, lines 55-57, col. 15, lines 52-54. Based on the teaching of Furukawa et al. that the signal is sampled and processed at a frequency of 8 KHz, the period of performing all the functions is 125 nanoseconds. That is, Furukawa et al. merely teaches performing each function for every sample, and not “for each frame,” as recited in claim 1. Furukawa et al., in fact, teaches away from the claimed invention.

Moreover, in the Response to Arguments section of the Office Action, the Examiner asserts that “Furukawa at col. 5, line 64 continuing to col. 6, line 12 describes the functionality of the echo canceller with implementation of the first and second adaptive filters which update the filter coefficients by NLMS and a voice detector, which reads on “control means” Office Action at page 8. Applicant respectfully disagree with the Examiner’s assertion because the Examiner has mischaracterized the teachings of Furukawa et al.

Furukawa et al. discloses “a voice detector 8 for detecting short time power of a received input signal to detect whether far-end speech is present or absent, where the second adaptive filter 3 executes adaptation when the voice detector 8 has detected a far-end speech.” Id. at col. 6, lines 2-6. Furukawa et al. further discloses “a double talk

detector 9 controls to estimate an impulse response of an echo path of the first adaptive filter 1 when, as a result of the voice detector 8 having detected far-end speech, either one of the first ratios R1 and R2 is greater than a first threshold Th1 or the third ratio R3 is greater than a second threshold Th2 (Th2=2, fixed in the embodiments).” Id. at col. 6, lines 6-12. That is, Furukawa et al. merely discloses a voice detector 8 that detects far-end speech and a double talk detector 9 and does not teach or suggest “control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means,” as recited in claim 1.

Further, in the Office Action, while the Examiner admits that “Furukawa does not specifically disclose using time and frequency domain information of the acoustic echo-canceled signal for checking[, for each frame,] whether or not voice is included in [the near-end speech] signal,” the Examiner attempts to cure these deficiencies by alleging that these missing elements “are known in the art, as indicated by applicant’s admitted prior art at page 20, lines 16-24 of the specification.” Applicant respectfully disagrees.

Applicant’s specification in the paragraph from page 20, line 16 to page 21, line 5 discloses:

Japanese Patent Application No. 213946/1993 (NTT) describes an acoustic echo canceler which uses a double talk detection circuit that decides whether a speech is included in an input voice signal by using time and frequency domain information of source information on the input voice signal (a signal before being echo-canceled) and on an additive noise with a known source. This echo canceler assumes that the echoes getting into the input voice signal

are only those influenced by the source signal. It therefore has a drawback of low double talk detection precision when there is ambient noise. Further, it does not have a buffer for holding an impulse response estimated by the adaptive filter (coefficient value of the FIR filter).

However, the above-quoted text does not disclose at least “checking, *in each frame*, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal,” as recited in claim 1. (Emphasis added).

Thus, Furukawa et al. and AAPA, either taken alone or in combination, do not teach or suggest at least “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal; storage means for storing one or more impulse responses in each frame; and control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means,” as recited in claim 1.

Moreover, the structural differences between the system disclosed in Furukawa et al. and the present claimed invention lead to significant advantages in performance of the claimed invention. In particular, while system of Furukawa et al. necessarily needs two adaptive filters (where the first adaptive filter estimates a pseudo echo while estimating an impulse response of the echo path and the second adaptive filter determines the presence of either a change of echo path or the existence of double talk), and each calculation of echo path requires considerable calculation, the two

adaptive filters together require a significant amount of calculation and memory resources. In contrast to the system of Furukawa et al, the present claimed invention utilizes only a single adaptive filter and the amount of calculation and memory resources required are reduced by half.

Further, as discussed above, Furukawa et al discloses executing the entire process sample by sample using only the time domain parameter. As a result, the double talk detection in Furukawa et al is also performed only in the time domain and it is unable to correctly detect double talk in a situation where there is background noise. Thus, the accuracy of estimation of the impulse response of the echo path in the first adaptive filter and the amount of echo cancellation is reduced. The present claimed invention, in contrast, utilizes double talk detection frame by frame and can correctly account for the double talk in the situation where there is background noise.

Further, in the Office Action, the Examiner asserts that “it would have been obvious to one of ordinary skill at the time of the invention to modify the system of Furukawa et al, to implement checking, in each frame, ... for the purpose of improving signal quality in a noisy environment.” Office Action at page 3. However, the Examiner has failed to point out *some teaching, suggestion, or motivation* found in either Furukawa, AAPA, or the knowledge generally available to one of ordinary skill in the art to modify Furukawa. The Examiner has merely combined the references and stated that it would have been obvious to do so, without pointing to the prior art that suggests the desirability of the combination. See, MPEP § 2143.01 (“The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.”); See

also, In re Gorman, 933 F.2d 982, 986-87, 18 U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991)(holding, "It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps.").

Further, if the Examiner is relying on the knowledge generally available to one of ordinary skill in the art to modify Furukawa, the Examiner has not provided support for this contention. See, In re Lee, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002) (holding that the factual question of motivation that is material to patentability can not be resolved on subjective belief and unknown authority); In re Zurko, 258 F.3d 1379, 59 U.S.P.Q.2d 1693 (Fed. Cir. 2001) (holding that the USPTO must point to some concrete evidence in the record to support core factual findings in a determination of patentability); Memorandum by Stephen G. Kunin, Deputy Commissioner for Patent Examination Policy (February 21, 2002)(stating that it is never appropriate to rely on common knowledge without evidentiary support as sole or principal evidence on which to base rejection); 37 C.F.R. § 1.104 (providing that when a rejection in an application is based on facts within the personal knowledge of an Examiner, the data should be stated as specifically as possible, *and the facts must be supported*, when called for by the applicant, by an affidavit from the Examiner); M.P.E.P. § 2144.03 (providing that the Examiner may only take official notice of facts outside of the record which are capable of instant and unquestionable demonstration as being "well-known" in the art and, if the Applicant traverses such an assertion, the Examiner *should cite a reference* in support of his or her position.). Should the Examiner maintain the rejection after considering the arguments presented herein, the Examiner must provide "the explicit basis on which the

examiner regards the matter as subject to official notice and [allow Applicant] to challenge the assertion in the next reply after the Office action in which the common knowledge statement was made” (Id. at 3, emphasis in original), or else withdraw the rejection.

Moreover, as stated in the M.P.E.P. § 2145, “it is improper to combine references where the references teach away from their combination.” As discussed above, Furukawa et al discloses performing all the functions *for every sample* and teaches away from the claimed decision means, storage means, and control means recited in claim 1, which perform their respective recited functions *in each frame*. Accordingly, it is improper to combine the teachings of Furukawa et al. with those of AAPA.

In summary, Furukawa et al. and AAPA, either taken alone or in combination, fail to teach or suggest each and every element of claim 1 and there is no motivation to combine the teachings of the cited references. Accordingly, the rejection of claim 1 under 35 U.S.C. § 103(a) is improper, and Applicant respectfully requests the Examiner to withdraw the rejection and allow the claim.

Claim 7 contains recitations similar to those in allowable claim 1. For reasons discussed above regarding claim 1, the Examiner has failed to establish a *prima facie* case of obviousness for claim 7. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejection of claim 7 under 35 U.S.C. § 103(a) and the claim allowed.

Claims 2 and 8

On pages 3-4 of the Office Action, the Examiner rejected claims 2 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al. in view of AAPA and further in view of Schalk.

Claims 2 and 8 depend from claims 1 and 7, respectively. As discussed above, regarding the rejection of claims 1 and 7 under 35 U.S.C. § 103(a), Furukawa et al. and AAPA, either taken alone or in combination, do not teach or suggest each and every element of independent claims 1 and 7. Schalk fails to cure the deficiencies of the combination of Furukawa et al. and AAPA. Specifically, Schalk does not teach or suggest at least “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal; storage means for storing one or more impulse responses in each frame; and control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means,” as recited in claim 1. Schalk also fails to teach or suggest similar recitations of independent claim 7.

At least because Furukawa et al., AAPA, and Schalk, either taken alone or in combination, fail to teach or suggest each and every element of independent claims 1 and 7, as noted above, the Examiner has failed to establish a *prima facie* case of obviousness for any claims dependent from claims 1 and 7. Accordingly, Applicant

respectfully submits that claims 2 and 8 , which depend from claims 1 and 7, are also allowable at least in view of their dependency from allowable claims 1 and 7.

Claims 3 and 9

On pages 4-5 of the Office Action, the Examiner rejected claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al., AAPA, Schalk, further in view of Flores et al.

Claims 3 and 9 depend, directly or indirectly, from independent claims 1 and 7, respectively. As discussed above, regarding the rejection of claims 2 and 8 under 35 U.S.C. § 103(a), Furukawa et al., AAPA, and Schalk, either taken alone or in combination, do not teach or suggest each and every element of independent claims 1 and 7. Flores et al. fails to cure the deficiencies of the combination of Furukawa et al., AAPA, and Schalk. Specifically, Flores et al. does not teach or suggest at least “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal; storage means for storing one or more impulse responses in each frame; and control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means,” as recited in claim 1. Flores et al. also fails to teach or suggest similar recitations of independent claim 7.

At least because Furukawa et al., AAPA, Schalk, and Flores et al., either taken alone or in combination, fail to teach or suggest each and every element of independent

claims 1 and 7, as noted above, the Examiner has failed to establish a *prima facie* case of obviousness for any claims dependent from claims 1 and 7. Accordingly, Applicant respectfully submits that claims 3 and 9, which depend directly or indirectly from claims 1 and 7, are also allowable at least in view of their dependency from allowable claims 1 and 7.

Claims 4, 5, 10, and 11

On pages 5-7 of the Office Action, the Examiner rejected claims 4-5 and 10-11 under 35 U.S.C. § 103(a) as being unpatentable over Furukawa et al., AAPA, and Schalk further in view of Rahim et al., Flores et al., and so-called well known prior art.

Claims 4-5 depend, directly or indirectly, from independent claim 1 and claims 10-11 depend, directly or indirectly, from independent claim 7.

As discussed above, regarding the rejection of claims 3 and 9 under 35 U.S.C. § 103(a), Furukawa et al., AAPA, Schalk, and Flores et al., either taken alone or in combination, do not teach or suggest each and every element of independent claims 1 and 7. Rahim et al. and so-called well known prior art fails to cure the deficiencies of the combination of Furukawa et al., AAPA, Schalk, and Flores et al. Specifically, Rahim et al. and well known prior art does not teach or suggest at least “decision means for checking, in each frame, whether or not a voice is included in the near-end speech signal, by using time domain information and frequency domain information of [an] acoustic echo-canceled signal; storage means for storing one or more impulse responses in each frame; and control means for, in a frame for which the result of decision made by said decision means is negative, storing in said storage means the current impulse response held by [a] supply means and, in a frame for which the result

of the decision is positive, retrieving one of the impulse responses stored in said storage means and supplying it to said supply means,” as recited in claim 1. Rahim et al. and well-known prior art also fail to teach or suggest similar recitations of independent claim 7.

At least because Furukawa et al., AAPA, Schalk, Flores et al., Rahim et al., and well-known prior art, either taken alone or in combination, fail to teach or suggest each and every element of independent claims 1 and 7, as noted above, the Examiner has failed to establish a *prima facie* case of obviousness for any claims dependent from claims 1 and 7. Accordingly, Applicant respectfully submits that claims 4-5 and 10-11, which depend directly or indirectly from claims 1 and 7, are also allowable at least in view of their dependency from allowable claims 1 and 7.

Moreover, amended claim 4 recites, among other things, “means for subtracting the cepstrum mean of the speech frame ... to correct in a lump multiplicative distortions that are dependent on microphone characteristics and spatial transfer characteristics from the mouth of the talker to the microphone, wherein said means for subtracting comprises first subtracting means for subtracting the cepstrum mean of the speech frame of each talker from the cepstrum of the speech frame of each talker and second means for subtracting the cepstrum mean of the non-speech frame of the talker and by said first subtracting means and said second subtracting means, said subtracting means corrects in a lump multiplicative distortions that are dependent on a microphone characteristics and spatial transfer characteristics from the mouth of the talker to the microphone.” Applicant submits that none of the cited references, either taken alone or in combination, teach or suggest at least the above-quoted elements.

Claims 6 and 12

On pages 7-8 of the Office Action, the Examiner rejected claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Rahim et al. and so-called well known prior art. Applicant notes that the Examiner has repeated the same rejection set forth in the Office Action dated December 31, 2002 verbatim in the outstanding Office Action and has not specifically addressed any of the arguments presented in the Amendment dated June 2, 2003. Applicant respectfully reminds the Examiner of her duty to answer all material traversed. See, e.g., MPEP § 707.07(f).

Applicant incorporates herein by reference all the previous arguments presented in the Amendment filed June 2, 2003 against the rejection of claim 6 and 12 and respectfully requests the Examiner to address the arguments set forth therein regarding claims 6 and 12. Specifically, among other things, Applicant respectfully requests the Examiner cite a reference in support of her position that it would have been obvious to: (1) modify the system of Rahim to perform a Fourier transform on a spectrum in order to obtain a cepstrum, as is well known in the art, *for the purpose of efficiently canceling multiplicative distortions*; and (2) use a CMS algorithm on a speech cepstrum and a non-speech cepstrum to provide an accurate estimate of other sounds or noise, so as to provide more efficient signal enhancement of the input signal to the speech recognizer.

Applicant maintains that claims 6 and 12 are allowable at least because neither Rahim nor the knowledge generally available to one of ordinary skill in the art teaches: (1) modifying the reference to produce the claimed invention; or (2) a reasonable expectation of success in modifying the reference to produce the claimed invention, the

Applicants traverse the Examiners findings because she has failed to meet the initial burden of establishing a *prima facie* case of obviousness.

Conclusion

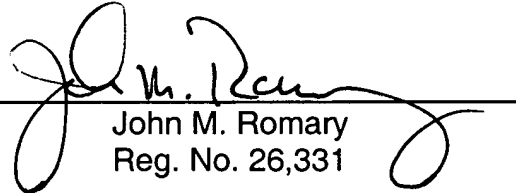
In view of the foregoing, Applicant respectfully requests the reconsideration and reexamination of this application and the timely allowance of the pending claims 1-12. Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: April 13, 2004

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